



15. How have energy efficiency programs in Michigan or other jurisdictions addressed non-traditional proposals for energy efficiency (e.g. digital metering, grid management technologies, or improvements on the utility side of the meter)?

Most policies identified as “energy efficiency programs” have directed utilities to assist their customers in achieving energy efficiency and have neglected these additional options. There is a background assumption that utilities will optimize their own operations as a matter of good business practice. However, utilities that are regulated on the basis that they may recover “costs of service” are not generally incented for maximum performance. As a result, there are usually ample opportunities for energy efficiency within utility operations. Utilities have recently given attention to these opportunities largely as a result of Federal funding and advocacy for “smart grid” investments.

Smart metering potentially provides detailed measurements of electricity consumption for each customer. If such data are made available and usable by customers and third-party analysts, there often are significant energy efficiency opportunities that can be identified and acted upon but about which there would be considerable uncertainty absent these data. Further, smart metering data can be used as the basis for performance contracts that might otherwise be difficult for non-utility parties to enforce. Most utilities have resisted making full data available, or at least have failed to make it convenient. A White House initiative organized through the National Institute of Standards and Technology has produced an industry effort called the “Green Button Initiative”. Under this program, each participating utility provides a “Green Button” on their website from which the utility customer can obtain their data in a standardized format. At this time, while a number of utilities across the country have at least committed to participating in the “Green Button Initiative, no Michigan utility has announced that they will participate.

Another non-traditional opportunity for energy efficiency that has arisen from the advent of “smart grid” technologies is the use of dynamic volt-VAR control to reduce line losses. Alternating current wave forms are distorted by end-use devices that include capacitance or inductance in their operation. These distorted wave forms cause “back and forth” flows of power that both use line capacity and increase line losses of power in the distribution grid. They also reduce the performance of some customer devices and accelerate wearing-out of some equipment. Using real-time sensors and controls in the distribution grid to accurately control voltage and reactive power (VAR) can reduce line losses. In addition, when voltage and reactive power are dynamically controlled, the utility is enabled to use conservation voltage regulation which is reducing the target voltage on the distribution system below the nominal target during periods of high load, thereby both reducing line losses and peak generation capacity requirements. A description of these technologies and practices and results to date can be found at

<http://www.smartgrid.gov/sites/default/files/doc/files/VVO%20Report%20-%20Final.pdf> . The results vary with the aggressiveness of conservation voltage regulation, but clearly demonstrate potential benefits of at least 1.5% reduction in annual energy consumption and approximately 2.5% reduction in peak load. Theoretically, energy consumption reduction could average as high as 4-5%. It should also be noted that dynamic volt-VAR control also increases the expected life of some distribution grid equipment, reduces outage frequency due to distribution equipment failure, and facilitates high penetration of distributed solar generation.

There are also significant opportunities for energy efficiency in power generating stations. The premier example is the use of combined heat and power, in which the heat produced to generate electricity is then used either for building heat or industrial process heat. In Michigan, some municipal utilities operate in this fashion with heat provided to customers through a district heating system. There are also a few industrial implementations, but these are relatively rare. Chapter 5 of the ACEEE's "The 2012 State Energy Efficiency Scorecard"

(<http://www.aceee.org/sites/default/files/publications/researchreports/e12c.pdf>) thoroughly compares the programs and results of combined heat and power policies in the various states. According to the Michigan Public Service Commission's 21st Century Energy Plan, Appendix II (available at http://www.michigan.gov/documents/mpsc/energyplan_appendix2_185279_7.pdf) which was the last comprehensive assessment, Michigan has unused combined heat and power potential of more than 675 MW electricity generation capacity.

Efficiency in utility-owned power generation plants is largely determined by the generation technology installed when the plant was built or in major component replacement projects. It is also possible to improve the efficiency of plants through targeted investments. The overall results can be evaluated by considering the "heat rate" of the plant in comparison to other plants using similar fuel. Heat rate measures the heat content of fuel consumed per unit electricity generated. Perusal of heat rate of the power plants of Michigan's investor owned utilities as reported by them in annual reports to the Michigan Public Service Commission (available at http://michigan.gov/mpsc/0,4639,7-159-16377_17104-214349--,00.html) shows most of their plants to have heat rates at or above the national averages reported by the Energy Information Administration. A high heat rate indicates that the plant is inefficient.